DRAFT ASSESSMENT SCHEDULE – For planning purposes only

Physics 2.6: Demonstrate understanding of electricity and electromagnetism

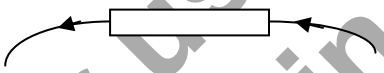
Assessment Criteria

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of electricity and electromagnetism by: • writing statements that show an awareness of how simple facets of phenomena, concepts or principles relate to a described situation • solving straightforward mathematical problems.	*Demonstrate in-depth understanding* of electricity and electromagnetism by: • writing statements that show understanding of how phenomena, concepts or principles relate to given situations. • using information that is not immediately obvious or directly usable for mathematical statements.	*Demonstrate comprehensive understanding* of electricity and electromagnetism by: • writing statements that show understanding of why phenomena, concepts or principles relate to given situations. • written descriptions will demonstrate understanding of connection between concepts including graphs and diagrams. • using mathematical solutions that demonstrate understanding of connection between concepts.

Evidence Statement

One	Not achieved		Achievement		Achievement with Merit		Achievement with Excellence	
	N0 N1	Not achieved ONE correct	A3	ONE correct	M5	ONE correct	E7	ONE omission
	N2	TWO correct	A4	TWO correct	M6	TWO correct	E8	ALL correct
(a)	The electron gains kinetic energy. The electron gains potential energy.		Describes the electron gains kinetic energy when free to move in an electric field. Describes the electron gains potential energy when forced to move against the electric field		Demonstrates in-depth understanding by stating the electron loses electric potential energy and gains kinetic energy when moving in the electric field Demonstrates in-depth understanding by stating the electron loses kinetic energy and gains electric potential energy when forced to move against the electric field.			
(b)	$E = \frac{V}{d}$ $E = \frac{F}{q}$		Solves: $E = \frac{V}{d} = \frac{200}{0.004}$ $\mathrm{E} = 5.0 \times 10^{4}\ \mathrm{Vm^{-1}}$ $F = Eq$ $F = 5.0 \times 10^{4} \times 1.6 \times 10^{-19}$ $F = 8.0 \times 10^{-15}$		Solves: $E_p = Fd$ $E_p = 8.0 \times 10^{-15} \times 0.004$ $E_p = 3.2 \times 10^{-17}\ \mathrm{J}$ $E_k = 3.2 \times 10^{-17}\ \mathrm{J}$		Solves: $3.2 \times 10^{-17} = 0.5 \times mv^2$ $v^2 = 7.1 \times 10^{9}$ $v = 8.4 \times 10^{6}\ \mathrm{m\ s^{-1}}$	
(c)	No force. Force increases or force decreases.		Describes that the force is the same throughout.		Explains the force is the same throughout because the electric field is uniform.			

Two	Not achieved		Achievement		Achievement with Merit		Achievement with Excellence	
	N0 N1	Not achieved ONE correct	A3	TWO correct	M5	TWO correct	E7	ONE omission
	N2	TWO correct	A4	THREE correct	M6	THREE correct	E8	ALL correct
(a)	$4+5=9$ $3+2+4+5=14$		$3+2=5\Omega$ $\left(\frac{1}{4}+\frac{1}{5}\right)^{-1}=2.22\Omega$		$\left(\frac{1}{4}+\frac{1}{5}\right)^{-1}=2.22\Omega$ $3+2=5\Omega$ $5+2.22=7.2\Omega$			
(b)	$I=VR$		$I=\frac{V}{R}=\frac{9.0}{7.2}$ $I = 1.025$ A		$V_{3\Omega} = 3\times 1.25 = 3.75$ V $V_{2\Omega} = 2\times 1.25 = 2.50$ V $V_{5\Omega} = 9.0 - (3.75 + 2.50)$ $V_{5\Omega} = 2.75$ V OR $V = 2.22 \times 1.25 = 2.77$ V			
(c)	The 5 Ω resistor draws more power. The greater the resistance, the greater the voltage across it for the same current.		Describes power depends on both voltage and current. Describes ONE correct calculation for power. This could be either 3 Ω resistor = 3.75 × 1.25 = 4.69 W OR power drawn by 5Ω resistor $=\frac{V}{R}\times 2.75=\frac{2.75^2}{5}$ $= 1.5\ W$		Explains by calculating power drawn by 3 Ω resistor = 3.75 × 1.25 = 4.69 W Explains by calculation power drawn by 5Ω resistor $=\frac{V}{R}\times 2.75=\frac{2.75^2}{5}$ $= 1.5\ W$		Explains in detail power depends on both voltage and current. $P = VI$ Voltage across 5 Ω resistor is 2.75 V and the voltage across 3 Ω resistor is 3.75 V. The current through 3 Ω resistor is 1.25 A. Hence power drawn by 3 Ω resistor is 4.69 W. Power drawn by 5 Ω resistor is 1.5 W. Explains in detail both the voltage across and the current through the 5 Ω resistor is less than that of the 3 Ω resistor. Hence the 3 Ω resistor draws more power from the battery.	

Three	Not achieved		Achievement		Achievement with Merit		Achievement with Excellence	
	N0 N1	Not achieved TWO correct	A3	ONE correct	M5	ONE correct	E7	ONE omission
	N2	THREE correct	A4	TWO correct	M6	TWO correct	E8	BOTH correct
(a)	The electrons feel a force. This causes the electrons to move.		Describes that the electrons feel a magnetic force and so move to one end of the wire leaving the other end positive.		Explains the separation of charge causes an electric field to be formed. The electrons will also experience a force due the formation of the electric field.		Explains in detail that the force due to the electric field is opposite to the force due the magnetic field as experienced by the electrons. AND Charge separation continues until the magnetic force is equal and opposite to the electric force.	
(b)	$B = BvL$ $V = 0.80 \times 12 \times 65$		Calculates : $V = 0.80 \times 12 \times 0.65$ $V = 6.24$ V (*or consequential error accepted for M in 3 (c)?)*					
(c)	Current is anticlockwise**.**		Shows OR states that the current is anticlockwise: $V = IR$ 		Calculates: $I = \frac{6.24}{4.5}$ $I = 1.39$ A			

Judgement Statement

Achievement	Achievement with Merit	Achievement with Excellence
Minimum of 2A	Minimum of 2M	Minimum of 2E